OUR ASTRONOMICAL COLUMN.

COMET 1888 *e* (BARNARD, SEPTEMBER 2).—The following ephemeris for this comet for Greenwich midnight is in continuation of that given in NATURE, vol. xxxix. p. 114:—

1888.	R.A. h. m. s.	Decl. ° ′	Log Δ.	Log *r*.	Brightness.
Dec. 15	1 4 21	7 41·2 S.	0·1390	0·2810	8·7
17	0 56 52	7 43·1			
19	0 49 59	7 43·4	0·1654	0·2776	7·8
21	0 43 38	7 42·4			
23	0 37 47	7 40·1	0·1916	0·2744	7·0
25	0 32 24	7 36·9			
27	0 27 29	7 32·8 S.	0·2170	0·2715	6·3

The brightness on September 2 has been taken as unity.

The spectrum of the comet presents no very interesting feature, as it is mainly continuous, with but little evidence of the bright hydrocarbon bands.

Y CYGNI.—Although it is only just two years since Mr. Chandler discovered this variable, and but comparatively few minima have therefore yet been observed—the fewer that the star seems to have been unaccountably neglected by European observers—yet some strange and strongly-marked anomalies have already been observed in its period. Although the light-curve is of such a shape as to enable the minima to be determined with much precision, the variations in brightness proceeding with relatively great rapidity, and Mr. Chandler had therefore believed that the period he had deduced from his 1886 and 1887 observations could not be more than a second or two in error, he found, when the star came again under observation in the spring of 1888, that the ephemeris required a correction of four or five hours, and this difference increased until, in the October just past, it had amounted to nearly seven hours. Dividing all the observations into five groups, they give the following values for the period:—

d.	h.	m.	s.
1	11	56	31·8
		57	45·3
		58	19·5
		58	30·9

The observations from which these periods have been deduced include five minima determined by Mr. Sawyer, three by Mr. Yendell, and thirteen by Mr. Chandler himself. Using his own observations alone, he has roughly represented them by the following elements: 1889 January 25, 5h. 39·6m. (G.M.T.), + 1d. 12h. 0m. 0·12s. $(E - 519)$ + 0·24s. $(E - 519)^2$; the elements being referred to epoch 519 on account of the convenience of the period at that time being so nearly commensurate with a solar day. But these elements leave residuals far too large to be regarded as errors of observation, whilst the lengthening of the period, half a second between two successive recurrences, is entirely unparalleled in amount by the irregularities in other Algol variables. Mr. Chandler considers that this change is far more likely to be periodic, and of short period, than secular, and it is therefore specially to be desired that observers will follow it with all attention, for the complete knowledge of its changes must throw much light on the whole subject of variation of the Algol type. At present the minima occur soon after sunset, for England, on December 17, and every third following day, and shortly before sunrise on December 19, and every third following day. It is to be hoped that English observers will give a most persistent attention to this star, now so clearly a most important one.

RECENT SKETCHES OF JUPITER.—Vol. xlix. of the *Mémoires couronnés* of the Royal Academy of Sciences of Belgium, contains a valuable series of observations of Jupiter by Dr. F. Terby, of Louvain. This series, which contains his observations from 1882 to 1885, is in continuation of a former memoir, which appeared in vol. xlvii. of the same publication, and is soon to be followed by a third containing the results of his work in 1887. In this present memoir Dr. Terby has made some first efforts towards the identification of details on the surface of Jupiter in successive rotations, a work which he considers he has been able to carry on more successfully in his third series. The present memoir is illustrated by 100 sketches of the planet, which, if of no great beauty or minuteness of detail, are very creditable when the smallness of the telescope used—only 3½ inches aperture—is borne in mind, and are valuable from their number and the completeness of the series which they form. The 1887 observations were made with Dr. Terby's new telescope of 8 inches aperture, which has given excellent proof of its good quality.

On one occasion (1884 February 16) Dr. Terby was fortunate enough to watch the shadow of the first satellite pass over a bright white spot. The shadow lost none of its blackness in the transit, showing that the white spot was in no perceptible degree self-luminous.

85 PEGASI.—Some recent observations which Mr. Burnham has obtained of this close and difficult double, discovered by him in 1878, have enabled Mr. Schaeberle (*Gould's Astronomical Journal*, No. 185) to compute an approximate orbit, from which it appears that the star has a period of 22·3 years, and an eccentricity of 0·35, and that it passed through periastron at the beginning of 1884. The other elements are—

$$\pi - \Omega = 70^\circ{\cdot}3 \quad \ldots \quad i = 68^\circ{\cdot}6$$
$$\Omega = 306^\circ{\cdot}1 \quad \ldots \quad a = 0''{\cdot}96$$

From observed position-angles and distances of the third star, C, the following result has been obtained for the relative proper motion of 85 Pegasi, viz. annual motion being 1″·305 and its direction 140° 20′·4, or in R.A. and Decl., $\Delta\alpha = + 0''{\cdot}833$; $\Delta\delta = - 1''{\cdot}005$. The comparison star, C, would appear to have a slight proper motion also, as these values differ somewhat from those obtained for 85 Pegasi by Argelander, Mädler, and Brünnow.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 *DECEMBER* 16–22.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on December 16

Sun rises, 8h. 3m.; souths, 11h. 56m. 7·7s.; sets, 15h. 50m.: right asc. on meridian, 17h. 38·3m.; decl. 23° 22′ S. Sidereal Time at Sunset. 21h. 33m.

Moon (Full on December 18, 11h.) rises, 15h. 3m.; souths, 22h. 48m.; sets, 6h. 43m.*: right asc. on meridian, 4h. 32·5m.; decl. 18° 23′ N.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	7 34	11 26	15 18	17 8·0	23 34 S.
Venus	10 38	14 45	18 52	20 27·5	21 16 S.
Mars	10 50	15 14	19 38	20 56·5	18 36 S.
Jupiter	7 32	11 30	15 28	17 12·5	22 36 S.
Saturn	20 24*	3 51	11 18	9 31·5	15 44 N.
Uranus	2 14	7 38	13 2	13 19·4	7 43 S.
Neptune..	14 26	22 10	5 54*	3 53·8	18 32 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·4	81 16 N.	Dec. 19,	22 44	*m*
V Tauri	4 45·6	17 21 N.	,, 17,		*M*
R Canis Majoris	7 14·5	16 12 S.	,, 18,	21 24	*m*
		and at intervals of		27 16	
U Monocerotis	7 25·5	9 33 S.	Dec. 16,		*M*
R Crateris	10 55·1	17 43 S.	,, 18,		*M*
S Virginis	13 27·2	6 37 S.	,, 17,		*M*
U Coronæ	15 13·6	32 3 N.	,, 18,	6 9	*m*
β Lyræ	18 46·0	33 14 N.	,, 20,	7 0	m_2
S Vulpeculæ	19 43·8	27 1 N.	,, 17,		*m*
η Aquilæ	19 46·8	0 43 N.	,, 21,	6 0	*M*
S Sagittæ	19 50·9	16 20 N.	,, 20,	17 0	*m*
R Sagittæ	20 9·0	16 23 N.	,, 21,		*m*
T Vulpeculæ	20 46·7	27 50 N.	,, 22,	2 0	*M*
Y Cygni	20 47·6	34 14 N.	,, 16,	5 40	*m*
		and at intervals of		36 0	
δ Cephei	22 25·0	57 51 N.	Dec. 22,	0 0	*M*

M signifies maximum; *m* minimum; m_2 secondary minimum.

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Meteor-Showers.

	R.A.	Decl.	
Near Pollux	115° ...	32° N. ...	Rather swift.
	195 ...	67 N. ...	Swift; streaks.

GEOGRAPHICAL NOTES.

GREAT activity is still being displayed by German explorers in the interior of Togo-land. Captain C. von François has brought to a successful termination his journey into the country confined within the great bend of the Niger. The route taken by him was as follows: viz. Kpandu, Salaga, Jendi, Gambaga, and then across the upper course of the Volta at Bupere (the river at this spot, though more than 80 yards broad, is no longer navigable). From this point he arrived on April 19 last at Surma (11° 28′ N. lat.) in the country of Mosi. He afterwards made an excursion from Gambaga to the south-west by way of Nantong to the River Volta, and returned to the coast through Adeli. In the latter place he met Dr. L. Wolf, who founded a station there on the Adado Mountains in the beginning of May, having travelled to Adeli through the eastern part of Togo-land. Dr. Wolf has, with the aid of a mercurial barometer, been able to determine numerous altitudes with greater accuracy than any measurements previously made in this part of Africa. It appears from his results that Dr. Henrici has considerably over-estimated the height of the Agome Mountains. Herr von Puttkamer, the Imperial Commissioner, made in March an excursion into the region of the French Protectorate as far as the lower course of the Mono, and then explored the country of Agotime up to the foot of the mountains. All these travellers agree in stating that the prospects of the interior of Togo-land are very favourable, both as regards agriculture and commerce. The climatic conditions of these uplands are much more favourable than those of the coast.

THE last issue of the *Bollettino* of the Italian Geographical Society, which is a double number for October and November, publishes an account by Dr. Leopoldo Travesi of an expedition he made last November to the almost unknown district of Jimma (Jimma-Kakka, Jimma Abba-Jifar) on the debatable borderland between Abyssinia and Kaffa. Jimma constitutes a petty Mohammedan State tributary to Menelek, King of Shoa, in the Upper Valley of the Ghibeh, which is an important head-stream of the Gugsa, and which had hitherto been crossed only by one European, Travesi's fellow-countryman, Cecchi. Through fear of "annexation" or "protection," Europeans are jealously excluded, and Travesi only succeeded in penetrating into the country by joining the suite of its ruler, Abba-Jafir, who was returning from a visit to his suzerain, King Menelek. Jimma forms a deep upland valley over 6000 feet above sea-level, about 40 miles long and 10 broad, and inhabited by an extremely mixed population, in which the Abyssinian, Galla, and Negro elements are intermingled in diverse proportions. Hence the great variety of types, and colours ranging from the relatively fair and regular Hamitic to the dark and nearly pure Negro, as well illustrated by the numerous photographs Travesi succeeded in obtaining, and eight of which are here reproduced. The penal code of Jimma is remarkable for its simplicity, most offences being punished by "banishment," which is here a euphuistic expression for "slavery." Hence to the traveller's question, "What do you do with your thieves and other criminals?" the prompt reply invariably was "We drive them from the country," meaning "We sell them." Had Travesi been allowed to penetrate a little further south, he would have solved the problem of the Juba and Sobat (White Nile) water-parting. As it was, he was able, from native report, almost to satisfy himself that the Gugsa, here called the Uma and elsewhere the Abula, flows, not west to the Nile basin, but south-east to Lake Abbala, which is known to be in the Juba basin. Consequently the Gugsa may be regarded as the chief head-stream of that river. He also heard of d'Abbadie's Mount Wosho, here however called *Woso*, which lay away to the south-east, and to describe the altitude of which the natives exhausted the language of hyperbole. They could not exactly say where it was, except that the country was called Am'ca (?), but they knew quite well it was the highest mountain in the world, lost in the skies, &c. The Wosho, whose existence was lately imperilled by certain vague reports, seems thus, at all events, "rehabilitated."

ELECTRICAL NOTES.

THE magnetic elements for Paris for 1888 are—

Declination	15° 52′ 1″
Dip	63° 14′ 7″
H	0·19480
V	0·42245
Total force	0·46520

SORET (*Arch. des Sciences*, April 1888) has reproduced Oliver Lodge's experiment on the dissipation of fog on a small scale by placing a platinum cup, containing water in a boiling condition, by a Bunsen flame in connection with one pole of an influence machine and a point above the water in connection with the other pole. When the machine is not at work, so-called steam ascends undisturbed, but when the machine is excited the clouds whirl and move about in a flame-like fashion, until the vapour disappears entirely. The experiment is made in a dark room, and the cup is illuminated by a beam of electric light.

C. L. WEBER (*Ann. Wiedemann*, xxxiv. p. 576) has made some interesting observations on the variation of the resistance of alloys of tin-lead and tin-bismuth at their period of fusion. A considerable and rapid increase of resistance is observed as the fusing-point is reached, and it is the more marked the simpler the composition of the alloys. Pb_2Sn behaves like pure tin. The tin-bismuth alloys are very irregular, for the specific resistance of bismuth falls as the point of fusion is reached.

VON OETTINGEN (*Ann. Wiedemann*, xxxiv. p. 570) has been repeating his old experiments on the oscillatory discharges of Leyden jars, and he has obtained some admirable photographs of sparks. They give periods of oscillations varying from 19 to 39 millionths of a second.

THE use of Gassner's dry cell is making great progress in Germany. In the latest form hydrated ferric oxide is used as the depolarizer. Ferric oxide is said to abandon all its oxygen in presence of sal ammoniac.

A NOVEL trial is about to commence in Philadelphia. It is to decide the question whether electricity is a condition or a thing, and whether it is something which is manufactured.

A CONGRESS OF ELECTRICIANS will be held in Paris, in 1889, under the presidency of M. Mascart, and under the auspices of the International Society of Electricians. It is proposed to hold the meeting in September, but the British Association meeting in Newcastle will prevent many English electricians from being present.

THE term "therm," in place of *calorie*, for the unit of heat in the C.G.S. system has not met with general approbation, as the other names applied to these units have done. It was, perhaps, hastily accepted; but has it occurred to the dissentients that it might be dispensed with altogether, and that the unit of work "Joule" answers all the purpose of a unit of heat? There are 4·2 *Joules* in a *therm*. They are of the same dimensions, and really indicate the same physical quantity, viz. the mechanical equivalent of heat. Calorie will, however, perhaps hold its own, now that the C.G.S. system is so generally adopted. The only reason that led to the acceptance of the therm was the confusion arising from the kilogramme-degree, as well as the gramme degree, being called a calorie, but the former is fast going out.

THE ANNIVERSARY OF THE ROYAL SOCIETY.[1]

IN the month which intervened between our last anniversary and the end of the year, the Society lost four of its Fellows. In addressing the Fellows last year, I referred to the loss which science had sustained through the death of the illustrious Kirchhoff, and before three weeks were out, one followed him to the grave whose researches on the connection between the emission and absorption of radiant heat and light were closely akin to those of Kirchhoff. I refer to Balfour Stewart, who, shortly after landing in Ireland, whither he had gone to spend the Christmas with his family, was suddenly carried off after only a few hours' illness, shortly after he had entered on his sixtieth year. His name is widely known on account of his scientific work in heat, magnetism, and solar physics. He has been a member of the Council, and the Rumford Medal of the Society was awarded to him for the particular research to which I alluded at the outset. The other three of our ordinary Fellows

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[1] Address of the President, delivered at the Anniversary Meeting, on November 30.

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